Overview of Mercury Monitoring

Emissions Monitoring Branch
CAMD

A Few Mercury Specific Issues

- Mercury is emitted in low concentrations and it is difficult to measure, it can bio-accumulate creating developmental and neurological problems in humans.
- Mercury emission depositional effects depend on the speciation of the emitted mercury. The common forms are elemental, ionic and particulate.

A Few Mercury Specific Issues

- Most of the mercury in the atmosphere is elemental mercury, and being insoluble, does not readily deposit after being emitted.

- Ionic mercury is soluble and precipitates at the local and regional level. Some particulate mercury precipitates as well. These two forms are the main focus of local concerns.

- Both ionic and particulate mercury are soluble and can be oxidized. Hence can be collected from the flue gas stream.

A Few Mercury Specific Issues

- In coal-fired boilers, mercury speciation is dependent on coal properties. As compared to other coals, combustion of bituminous coals typically has a higher fraction of ionic and particulate mercury

- Controls can effectively reduce mercury emissions by 20 to 80 percent depending on the speciation of mercury in the flue gas, some can capture up to 90 percent of the ionic mercury.

Mercury Monitoring "Mantra"

- What is the main goal of any emissions monitoring approach?
- *Having accurate and reliable emissions data for each affected unit in a cost effective way .*

- What are the three dimensions to be considered in evaluating any emission monitoring approach?
  - *Accuracy*
  - *Possibility of using data for control or process improvement, and*
  - *Ability to demonstrate ongoing performance.*

Mercury Monitoring Approaches

- Stack testing
- Monitoring Hg in Fuels
- CEMs

Stack testing

- Benefits:
  - Cost when compared to CEMs
- Limitations:
  - Snapshot in time, no real time operating data.
  - Complexity of Test Methods can create QA/QC problems
  - Inadequate basis for evaluating changes in control performance,
  - Perception problem. Higher testing frequency required to assure public and local jurisdictions.

Brief fuel sampling analysis

- Benefits:
  - Simplicity
  - Cost
- Limitations:
  - Fuel stream lacks homogeneity
  - Sample frequency to make the process representative can be high
  - Time delays in the process of analyzing data, no real time operating data.
  - Perception problem, calculated emissions as opposed to measured ones.

Summary of the previous techniques. (Pros)

- Provide economical tools for distinguishing low and high emitters
- Certain low mass emitters units can use stack testing and fuel monitoring as an effective emission monitoring tool.
- Have established "track records" of use in other industrial sectors.

Summary of the previous techniques (Cons)

- The frequency of the data collection to provide for a reasonably and rapid feedback may be high, increasing the paperwork and burden.
- Analysis are not instantaneous and review time for the data takes longer than with automated systems. Adjustments to operational parameters are more difficult.
- Provides a limited basis for cumulative emissions characterization, which is important for accumulative and biopersistent threats.

CEMs

- Benefits:
  - Provide Real time operating data and potential for emission reductions
  - Emissions are measured not calculated or estimated, contributing to confidence in reports
  - Provides an opportunity to improve operations and increases public confidence in the control measure.

CEMs

- Difficulties:
  - Capital and operational costs
  - Despite considerable foreign experience, issues could arise with respect to
    - Long term monitor performance and maintenance
    - Applicability on a large scale
    - QA resource availability

IF

CEM Monitors are to be applied to a large number of US Sources ...

Hg CEM issues needing to be addressed prior to the application

- Reproducible test methods and performance certification tests for Hg CEM systems must be available in a format compatible with Hg CEM technology.
- Some issues to consider are:
  - Frequency of unit calibration to verify performance (i.e.daily calibrations as current programs)
  - Development of stable and affordable reference gases
  - proper characterization of intereferences
  - Delectability levels.

Summary

- Complete, consistent, and robust measurement of emissions is essential to ensuring the integrity of any emissions control program.

- The solution to Hg emissions monitoring may not be answered with only one approach, but a combination.